ABSTRACT

Title of Thesis: **PARENTAL MONITORING, SENSATION SEEKING AND MARIJUANA USE: CORRELATIONS AND AN INTERACTIVE MODEL**

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This study focused on the independent and interactive effects of parental monitoring and sensation seeking on marijuana initiation in college. Data from the College Life Study was used to examine 314 individuals who had not used marijuana prior to college. Descriptive statistics and t-tests analyzed significant differences between individuals who initiated marijuana in college (n=127) and those who did not (n=187). Logistic regressions tested theoretical models and an interaction between sensation seeking and parental monitoring on the likelihood of initiating marijuana.

Approximately 40% of the sample initiated marijuana in college. Significant differences in multiple variables existed between initiators and non-initiators. Sensation seeking and parental monitoring independently influenced the likelihood of initiating marijuana, however their interaction was insignificant. Post-hoc analyses indicated a gender specific moderation. Future research should examine the influence of gender.

PARENTAL MONITORING, SENSATION SEEKING AND MARIJUANA USE: CORRELATIONS AND AN INTERACTIVE MODEL

by

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INTRODUCTION

Drug use among adolescents is an ongoing concern in epidemiological and criminological disciplines. According to a national study of adolescents, 47% of high school seniors have used at least one illicit substance during their lifetime (National Institute on Drug Abuse, 2007). The public health implications of this figure have prompted researchers to investigate an array of associated behaviors and trends linked to substance use. Studies have linked substance use to a variety of factors including personality characteristics and other intrapersonal issues, interpersonal relationships, and environmental factors (Core Institute, 2005; Gillespie, Holt, & Blackwell, 2007).

Although prior research has shown that substance use tends to increase during early adolescence and peak around age 18 (Kandel & Logan, 1984; Kosterman, Hawkins, Guo, Catalano, & Abbott, 2000), college students are at extreme risk for substance use (Arria, Caldeira, O'Grady, Vincent, Fitzelle, Johnson, & Wish, 2008a; Sessa, 2005). The U.S. Department of Education reported that approximately 18 million students were enrolled in Title IV schools in fall 2005 (Knapp, Kelly-Reid, Whitmore, & Miller, 2007). Of these students, 4,293,654 were entering their first year of college. With such large numbers, it is important to examine the reasons why college students are at extreme risk for substance use. The transition from high school into college is often accompanied by less parental supervision and increased freedom, as well as opportunities for introduction to illicit drugs from which the individual may have otherwise been "sheltered."

Regardless of education status, both college students and non-college students with similar demographics use illicit substances. College students, compared to their non-college counterparts, have a lower lifetime prevalence of illicit substance use (50.5%

and 60.5% respectively) (Johnston, O'Malley, Bachman & Schulenberg, 2008a). However, differences in prevalence of use between college students and non-students disappear when examining substance use in the past year or in the past 30 days.

Although research on adolescent substance use is extensive throughout the literature, the amount of research on college students is somewhat limited. It is important to study what factors may influence college students' substance use while enrolled in college. Illicit substance use has been linked to lower levels of academic achievement, grade point averages, and educational attainment (Chatterji, 2006; Kahn & Kulick, 1975). According to the National Survey on Drug Use and Health, among young adults ages 18-20, rates of substance use were higher for school drop-outs than non-drop-outs (The NSDUH Report, 2003). Many surveys, including *Monitoring the Future* and *The Core Alcohol and Drug Survey*, have provided valuable findings about substance use among adolescents and college aged individuals; however, they do not address potential links between sensation seeking and other risk and protective factors of drug use during college.

The proposed research serves to fill a gap in the literature by examining what pre-college factors may influence the initiation of marijuana use during college. Aspects of both self control (sensation seeking and impulsivity) and social control (parental monitoring) theories will guide the research[1]. Both sensation seeking and parental monitoring can independently make an individual more susceptible to or prevent against drug use. Specifically, the research will center around both the independent influences and interactive effect of sensation seeking and parental monitoring on initiation of

[1] It is important to note that the measure of sensation seeking utilized in this study is solely used as a proxy for self-control. Although it cannot completely describe the idea of low-self control proposed by the General Theory of Crime (Gottfredson and Hirschi, 1990), it describes one important facet of self control.

marijuana in college. This is especially important given that high sensation seeking and low parental monitoring are two well-established risk factors for substance use. Examining the interaction between the two variables can potentially inform prevention strategies measures and provide important policy implications for how to best deal with risk factors operating under different social contexts. Further, parental monitoring and sensation seeking are especially important to examine in a college population due to the lowered level of parental monitoring associated with leaving for college and the introduction to an environment permeated by opportunities for illicit substance use. I will utilize data from the College Life Study, a longitudinal study of college students at a large, public, mid-Atlantic university. Data was initially collected from these students in a screener survey at their 2004 college summer orientation and thereinafter bi-annually, once in an in-person interview and once via a web survey. The study followed students throughout their college years and has received funding to continue research into their post-college years. Since the in-person interviews provide the most pertinent data relevant to this research, I will not include any data from the web-surveys. In addition, to maximize the utility of the longitudinal study, I will examine data from all four years of college.

The study is split into six main sections. The literature review provides a comprehensive summary of the research to date pertaining to adolescent and college drug use and factors associated with drug use. The research described provides the basis for the independent variables which will be utilized in the analytic section. Next, the theoretical frameworks supported by this research are described and will serve as the foundation for the research hypotheses. Third, a detailed description of the research

design and methods of the College Life Study is provided. Information regarding how the sample was obtained, and how survey modes and variable measures were utilized are discussed. The analytical approach will be conducted in three steps: descriptive statistics, bivariate analyses, and multivariate analyses. A thorough explanation of the analytical strategies is detailed. The last sections are the discussion and limitations and conclusions in which I will discuss shortcomings with both the College Life Study dataset and my own proposed analyses, as well as express the importance of the proposed research study and the contribution it will make to the literature.

LITERATURE REVIEW

College Substance Use

Monitoring the Future (MTF), an ongoing study conducted by the University of Michigan, examines a nationwide sample of 8th, 10th, and 12th grade students' behaviors and attitudes towards alcohol and substance use (Monitoring the Future, 2008). In addition, the longitudinal design of MTF allows students to be followed into their college years and middle adulthood. MTF also examines the rates of illicit drug use among comparable samples of non-college students. In 2007, non-college bound high school students were found to be more at risk for illicit drug use, tobacco use, and heavy drinking (Johnston, O'Malley, Bachman, & Schulenberg, 2008b). Nonetheless, according to the 2007 MTF, although lifetime prevalence of drug use among college students was lower than non-college students, the differences were less apparent for annual and 30-day prevalence-of-use rates (Johnston et al., 2008a). For example, the annual prevalence for any illicit substance use is 35% for both college students and their

non-college counterparts, although non-college students have higher rates of illicit drug use other than marijuana. According to the 2007 MTF, college males had a higher annual prevalence rate for the use of illicit drugs than females; the rates were 38% and 33% respectively (Johnson et al., 2008a). After alcohol, marijuana was the most frequently used drug among both genders for both college and non-college students.

The Core Alcohol and Drug Survey (2005), administered through the Institute at Southern Illinois University Carbondale, found similar results among college students' use of illicit drugs. In a sample of 33,379 students from 53 colleges in the United States, the study found an annual prevalence of 84.5% for alcohol, and 30.1% for marijuana.

Negative consequences of marijuana use

Although marijuana is often not considered a "hard" drug, there are still serious consequences associated with its use. In the general population, approximately 42% of cannabis-using young adults have a cannabis-use disorder (CUD) (Compton, Grant, Colliver, Glantz, & Stinson, 2004). In one study of college students, CUD was found in about 25% of past year users (Caldeira, Arria, O' Grady, Vincent, & Wish, 2008). Scholars report that use is associated with deficits in short-term memory and difficulty concentrating (Ashton, 2001). For example, users report studying for shorter periods of time, lower GPAs, poorer academic performance, and more class missed than non-users (Bell, Wechsler, & Johnson, 1997; Caldeira et al., 2008; Lynskey & Hall, 2000). In one study, Mustaine and Tewksbury (2004) dichotomized college students who have used marijuana in the past six months into two groups: Marijuana only users and harder drug users (with or without using marijuana). They found that those students who use marijuana only were more likely to frequently skip class and spend most of their leisure

time partying (Mustaine and Tewksbury, 2004). Similarly, Brook and colleagues found that early marijuana users are more likely to have lowered performance in school and occupational settings (Brook, Adams, Balka, & Johnson, 2002).

Risk and protective factors

It is important for researchers to examine both risk and protective factors of illicit drug use even before one gets to the college level. These factors may inform the design of substance use interventions. Scholars have looked at sociodemographic factors such as gender (Johnston et al., 2008a), race (Watt & Rogers, 2007), socioeconomic status, personality types (Arria, Caldeira, Vincent, O'Grady, & Wish, 2008b; James & Taylor, 2007), and sociological factors such as parental monitoring (Barnes, Hoffman, Welte, Farrell, & Dintcheff, 2006; Broman, Reckase, & Freedman-Doan, 2006; Pires & Jenkins, 2006; Steinberg, Fletcher, & Darling, 1994), peer association (Barnes et al., 2006; Pires & Jenkins, 2006; Steinberg et al., 1994), and religiosity (Bahr, Maughan, Marcos, & Li, 1998; Wallace, Yamaguchi, Bachman, O'Malley, Schulenberg, & Johnston, 2007).

Sociodemographic factors such a gender and race are significant predictors of substance use among adolescents. Researchers consistently report that males use illicit drugs more frequently than females, a finding that remains constant throughout all age categories (Johnston et al., 2008a; Johnston et al., 2008b). Males also initiate use and continue to increase their use at faster rates than their female counterparts (Kandel & Logan, 1984). For example, in the 2007 MTF, among young adults (ages 19 to 30 years old), males' annual use of any illicit drug was 35.4% while females' rate was 30.7% (Johnson et al., 2008a). Differences were even more evident when examining 30-day use (22.7% for males and 16.4% for females). Some studies find that African-

American/Black adolescents use alcohol at lower rates than their White counterparts, yet these two racial groups do not differ greatly on their incidence of drug use (Watt & Rogers, 2007).

There are many factors that may influence substance use among the adolescent and young adult population. In addition to demographic factors, researchers may also look at dynamics such as religiosity to examine other protective and/or risk factors associated with drug use. Available studies have shown that higher levels of religiosity are associated with lower levels of substance use (Bahr et al., 1998; Wallace et al., 2007).

Although sociodemographic factors may impact substance use, some scholars argue that one cannot separate sociodemographics from the socialization processes that occur within the family and among peers (Watt & Rogers, 2007). Theoretically, controls within the family and among peers are referred to as informal forms of social control. Overall, the Social Development Model (Catalano & Hawkins, 1996) incorporates theories of social control and social learning through the association with other individuals to explain drug use or non-use. Parent-child relationships are especially important in the socialization process. The overarching idea of "parental influence" encompasses such factors as parental warmth or rejection, parental type and behavior, parent-child communication and parental monitoring. Parenting types are often explained by using various prototypes. Baumrind (1971), for example, sets forth three parenting styles: permissive, authoritarian, and authoritative. Similarly, Maccoby and Martin's (1983) four parenting style prototypes include authoritative, authoritarian, indulgent, and indifferent (as cited in Adalbjarnardottir & Hafsteinsoon, 2001; Broman et al., 2006). The two approaches differ on the idea of indulgent and indifferent parenting. Baumrind

(1971) combines the two into the "permissive" prototype whereas Maccoby and Martin (1983) separate them into two distinct prototypes. Nonetheless, they agree on the basis behind authoritarian and authoritative parenting styles. Authoritative parenting is characterized by a high responsiveness to a child's needs, a warm and encouraging disposition, but with a firm and clear set of expectations of the child. Authoritarian parents are demanding, yet have a low level of responsiveness to the child's needs. Indulgent parents are both warm and responsive, yet place little demand on the child's behaviors. Indifferent parenting involves neither monitoring nor guidance from a parent to a child and displays weak demands for the child's behavioral control. Researchers have noted that parental warmth and acceptance are most associated with an authoritative parenting style, providing evidence that this parenting style influences drug use outcomes for adolescents and delinquency (Broman et al. 2006; Burt, Simons, & Simons, 2006). In a study of 347 adolescents attending ninth grade in Reykjavik, Iceland, adolescents who characterized their parents as authoritative were less likely to engage in marijuana use at age 17 than those adolescents whose parents were denoted as indulgent or neglectful (similar to Maccoby and Martin's indifferent prototype), and less likely to use amphetamines than those from neglectful families (Adalbjarnardottir & Hafsteinsoon, 2001).

In addition to parenting type, scholars contend that parental monitoring is especially important in understanding adolescent and young adult alcohol and drug use (Arria, Kuhn, Caldeira, O'Grady, Vincent, & Wish, 2008c; Barnes et al., 2006; Beck, Shattuck, Haynie, Crump, & Simons-Morton, 1999; Broman et al., 2006; Pires & Jenkins, 2007; Steinberg et al., 1994). According to a three-year study of 926 urban

youth conducted by Chilcoat and Anthony (1996), youths who were monitored least during middle childhood had a higher risk of marijuana, cocaine, and inhalant initiation. In addition, Kosterman et al. (2000) conducted a longitudinal study in which they interviewed 808 elementary school students every year from 1985 to 1991 and again in 1993 when they were 18 years old. By age 18, about 50% of the sample had tried marijuana at least once, and over 80% had consumed alcohol at least once. They observed that parents can delay the initiation of alcohol or marijuana use by communicating norms of substance use and proactively managing and monitoring their children. The delay of marijuana initiation was more strongly related to parental monitoring than the communication of substance use norms. The question of the effect of parental monitoring on substance use has also inspired research looking at college-aged individuals. In a study of 1,253 college freshman at a Mid-Atlantic university, researchers asked questions about students' substance use and the level of the parent's monitoring during their last year in high school (Arria et al., 2008c). Such questions included "When you got home from school, how often was there an adult there within an hour of you getting home?" and "When you went out, how often did you let your parents know where you planned to go?" Arria et al. (2008c) concluded that higher levels of parental monitoring and supervision in high school were associated with lower levels of both high school and college alcohol consumption. Moreover, the effect of parental monitoring in high school provided an indirect protective effect on alcohol consumption in college. The theory that high school drinking patterns are highly predictive of college drinking patterns has been supported by other studies. For example, in a study of 3,000 college students, Sher and Rutledge (2007) found a positive correlation between the level

of alcohol consumption in high school and the alcohol use reported in the first semester of college.

Gender differences have also been exposed in reference to parental monitoring and adolescent substance use. Steinberg et al. (1994) examined a sample of students from nine high schools at two different points in time and measured parental monitoring using a series of five questions: "How much do your parents really know… Who your friends are? Where you go at night? How you spend your money? What you do with your free time? Where you are most afternoons after school?" (p. 1061), with response option of: "do not know," "know a little," or "know a lot." The researchers assessed substance use by asking subjects to report "if they used alcohol excessively, smoked marijuana or used a drug other than marijuana since the beginning of the school year" (p. 1061). Both males and females who reported they were monitored less by their parents were involved with more substance use than their more monitored peers. Gender differences come into play, however, when looking at the levels of substance use. The authors report that at most levels of substance use involvement, females experience higher levels of parental monitoring, and are thus influenced more by these levels than males. However, the gap in the disparity in monitoring closes at the highest levels of substance use. Steinberg et al. (1994) also argue that parental monitoring is effective in both deterring the onset of substance use as well as lessening, if not completely desisting from usage.

Parental monitoring is often discussed in the context of peer relations as being predictive factors in adolescent problem behaviors (Barnes et al., 2006; Steinberg et al., 1994). Prior research suggests that the most crucial longitudinal predictors of the

progression to heavier drinking are low parental monitoring and association with friends who engage in alcohol consumption (Reifman, Barnes, Dintcheff, Farrell, & Uhteg, 1998). One plausible mechanism for the protective effect of high levels of parental monitoring on substance use is a decreased likelihood of deviant peer affiliation. In fact, Thornberry (1987) posits that parents who have a strong affective bond with their children are likely to lead their children away from delinquent peers and towards law-abiding friends and conventional beliefs. In one study, pro-social family processes such as rules and monitoring had a negative relationship with children's deviant peers (Oxford, Harachi, Catalano, & Abbott, 2001). Barnes and colleagues (2006) argue that although peer influences are associated with deviant behaviors, there still remains a protective effect of parental monitoring even after controlling for demographic characteristics and peer deviance.

Nonetheless, many studies do show that individuals who use drugs are more likely to have friends who also engage in substance use (Bahr et al., 1998; Barnes et al., 2006; Steinberg et al., 1994). The research is inconsistent with respect to the direction of the peer-drug relationship. Although some suggest that individuals are affected by their peers' substance use and problem behaviors, other researchers report that individuals seek out certain peer groups because of, for example, common drug behavior (see review by Bauman & Ennett, 1996). Still others find support for a bidirectional model of peer associations, arguing that uni-directional models are inadequate in describing the relationship between peers and delinquency (Thornberry, Lizotte, Krohn, Farnworth, & Joon Jang, 1994). Peer Cluster Theory suggests that "small, identifiable peer clusters determine where, when, and how drugs are used and that these clusters specifically help

shape attitudes and beliefs about drugs" (Oetting & Beauvais, 1986, pp. 19). According to Oetting and Beauvais (1986), young individuals share their ideas about drug use and help each other form rationales for their use. Parental monitoring may inhibit the relationship with deviant peers and delinquency. Flannery and colleagues (1999) reported that males and females who reported low levels of parental monitoring during after-school hours were significantly more likely to have higher levels of delinquency behavior, substance use, and vulnerability to peer pressure. Although deviant peer influences are significant predictors of adolescent problem behaviors, the effects of high parent monitoring may moderate the negative peer influences (Steinberg et al., 1994). More research is needed to assess the relationship between parental monitoring and deviant peer influences.

As noted earlier, the majority of this research incorporates the above risk and protective factors with a very integral theoretical component: self control and sensation seeking. Although generally neglected in criminological research, personality and psychological factors may have an affect on substance use. For example, fairly strong support has been attributed to the relationship between low self control and analogous delinquent behaviors such as cutting class, drinking, and smoking (Gottfredson & Hirschi, 1990). Gottfredson and Hirschi's General Theory of Crime (1990), also known as a theory of self control, argues that individuals with low self control have a "here and now" orientation (i.e. sensation seekers) and engage in impulsive, exciting, risky, and thrilling acts. Although the theory does suggest that low self control can help predict delinquency as well as substance use, research is lacking on the latter (Chapple, Hope & Whiteford, 2005). Impulsivity, anxiety, and aggression-hostility are all related to the

sensation seeking traits. According to Zuckerman and colleagues (1972), a sensation seeker is an individual who "needs varied, novel, and complex sensations and experiences to maintain an optimal level of arousal" (p. 308). The sensation seeking scale covers items related to thrill and adventure seeking (i.e. speed and danger), experience seeking (i.e. drugs and unconventional life styles), disinhibition (hedonism and gambling), and boredom susceptibility (dislike of repetition and routine). Overall, some research suggests that sensation seeking varies by gender and race, with males having higher levels of sensation seeking than females (Jaffe & Archer, 1987; Zuckerman, 2002) and African-Americans/Blacks having lower levels of sensation seeking than both White and Asian individuals (Jaffe & Archer, 1987). In a study of 98 undergraduates in an advanced psychology class, males' drug experience correlated significantly with all subscales of the sensation seeking scale except for the disinhibition subscale, while females' drug experience was significant with all subscales (Zuckerman, et al., 1972). Moreover, analyses showed that both males' and females' drug experiences were most highly correlated with items associated with experience seeking. In later publications, Zuckerman (1994) concluded that sensation seeking peaks in adolescence and declines with age, a finding analogous to the age-crime curve described by Gottfredson and Hirschi (as cited in Martins Storr, Alexandre, & Chilcoat, 2008). Gottfredson and Hirschi's theory contends that one's level of self control remains constant after it is set at age 8, however over time, self-control increases relative to that individuals level of self control at age 8. Prior research clearly establishes the link between sensation seeking and drug use (Arria et al., 2008b; Bates, Labouvie, &White, 1986; Martins et al., 2008,). In a study of 5,049 adolescents ages 12 to 18, Martins et al.

(2008) reported that high sensation seeking, especially when coupled with delinquent peers, was associated with greater ecstasy use. Marijuana has also been linked to levels of sensation seeking. In a study of 48 college and university students, cannabis users, defined as those who use three or more times per week, scored higher on the four subscales of sensation seeking than their non-user counterparts (Satinder & Black, 1984). For purposes of this paper, sensation seeking will be used as a proxy for self control, an element critical to one of the theories guiding this research.

THEORETICAL PERSPECTIVES

Various theoretical frameworks have been utilized to explain substance use and problem behaviors among adolescents. Due to the focus on aspects of both self and social control, I will draw from Gottfredson and Hirschi's General Theory of Crime and Hirschi's Social Control (Social Bonds) Theory. Both theories focus on the question of conformity, or why people do *not* commit crimes or participate in other deviant behaviors. Simply put, control theories focus on the forces that restrain an individual from committing a crime or partaking in deviant behavior. When these forces fail to constrain, crimes and other non-conventional behaviors occur (Vold, Bernard & Snipes, 2002).

Gottfredson and Hirschi's General Theory of Crime

Gottfredson and Hirschi's General Theory of Crime (1990) is rooted in the idea of self-control- a concept that suggests individuals differ in the extent to which they can hold back from committing criminal acts and deviant behavior. Low self control is

comprised of several elements of a “here and now” orientation. For example, Gottfredson and Hirschi describe individuals with low self control as being adventuresome, active, and physical. Although low self control is most commonly linked to crime, it has its manifestations in analogous behaviors such as smoking, drinking, illicit drug use, and gambling. The General Theory of Crime also accounts for socialization when discussing low self control. Gottfredson and Hirschi argue that the characteristics associated with low self control are created in the absence of parental nurturance, discipline or training. Moreover, they assert that ineffective child rearing and parent-child relations are primarily to blame for one’s lack of or low self control. According to Gottfredson and Hirschi, three conditions must be met in order to teach self control: The child’s behavior should be monitored, parents need to recognize deviant behavior when it occurs, and the child needs to be appropriately disciplined. They argue that parental supervision should have a two-fold effect: Prevent analogous acts (such as drinking and drugs use) as well as train the child to develop the ability to resist situational temptations in the future. The theory of self control asserts that by the time the child reaches 8 or 9 years of age, experience with parental child-rearing practices will have essentially determined his/her stable level of self control. Moreover, Gottfredson and Hirschi argue that parenting is critical to the development of self control, yet the parental influence is “exerted through the narrow conduit of self-control” (Unnever, Pratt, & Cullen, 2003: 472)

Although Gottfredson and Hirschi do account for changes in absolute stability, they argue that levels of self-control remain relatively stable between individuals. That is, the differences in self-control between two individuals at one age should be the same

as the difference in self-control between those same individuals at another age. Few scholars have examined self-control in a longitudinal context due to Gottfredson and Hirschi's argument that self-control – the most dominant predictor of criminal behavior- is a stable trait. Therefore, many argue that cross-sectional analyses are wholly sufficient (Pratt & Cullen, 2000). In the words of Hirschi and Gottfredson themselves, "Identification of the causes of crime at one age may suffice to identify them at other ages as well – if so, cohort or longitudinal studies of crime are unnecessary" (Hirschi & Gottfredson, 1995: 131).

Nonetheless, it is the eight year old age limit and stability hypothesis that is among the most controversial aspects of Gottfredson and Hirschi's theory. To date, only a handful of studies have tested the stability of Gottfredson and Hirschi's concept of self-control (Arneklev, Cochran, & Gainey, 1998; Burt et al., 2006; Hay & Forrest, 2006; Turner & Piquero, 2002). In a study assessing the stability postulate of self control, Hay and Forrest (2006) were only able to find partial support for the stability of self control over time. They examined U.S. children between the ages of 7 and 15 and found that 84% of the sample fit into trajectories in which levels of self control stayed relatively constant between 7 and 15 years old. However, 16% of the sample did not experience stable trajectories; rather, some experienced extreme changes. For example, 5% of the sample were coded as having low self control at age 7, yet high self control by 15 years old. Although Gottfredson and Hirschi do account for increases in absolute self-control, 5% of the sample experienced the increase in self-control at a slower rate and a later point than Gottfredson and Hirschi postulated. Hay and Forrest also found evidence of decreasing self control. Although the majority of their sample exhibited stable levels of

self control, one cannot discount the 16% who did not adhere to theory's main proposition. Similarly, in Turner and Piquero's (2002) study of the behavioral and attitudinal measures of self-control among offenders and non-offenders, attitudinal measures of self-control for the two groups seemed to converge on levels of self-control once approaching adulthood. This is especially important given that Gottfredson and Hirschi do not account for any deviation from stability in the self-control hypothesis. Moreover, Hay and Forrest (2006) assert that parenting socialization, including parental monitoring, can indeed affect levels of self-control in children and adolescents, either by increasing or decreasing it, past the cut-off age proposed by Gottfredson and Hirschi. Similarly, Burt and colleagues (2006) reported that parental efficacy, conceptualized as an authoritative parenting style, both indirectly (through self-control) and directly affected delinquency. That is, both authoritative parenting and improvement of authoritative parenting has a negative relationship with delinquency.

Hirschi's Social Control (Social Bond) Theory

Hirschi's Theory of Social Control, on the other hand, focuses on how an individual's bond to society influences his/her decision to partake in deviant behavior or commit crimes (Hirschi, 1969). That is, when a person's ties to conventional societal norms and bonds have been broken, that individual is free to commit delinquent and criminal acts. Hirschi's theory highlights the importance of four major elements of social bonds: attachment, commitment, involvement, and belief. Attachment element underscores the importance of an emotional connection to another individual, in which that individual is likely to be concerned about how they are viewed by the other person.

The commitment elements focuses on the premise that if an individual considers committing a deviant act, he/she (assuming he/she is committed) will consider the risks and costs of the act and rationally determine that it is not worth the cost. Essentially, committed individuals do not want to jeopardize any investments they have made. Involvement has its origins in the idea that "idle hands are the devil's workshop." That is, Hirschi argues that an individual *involved* in conventional activities has neither the time nor the opportunity to commit any deviant acts. This component of belief posits that individuals vary in the extent to which they *believe* they should obey conventional norms and rules of society. An individual who *believes* he/she should obey the rules is less likely to violate them.

Although Hirschi argues that all four elements are important in a social bond, this research will focus solely on the attachment element. It also tends to be the most frequently tested component of Hirschi's theory (Vold et al., 2002). Specifically, I will detail the importance of attachment to parents. According to Hirschi, attachment serves as a buffer from a violation of social norms, for "if a person does not care about the wishes and expectations of other people….then he is to that extent not bound by the norms. He is free to deviate" (1969: 18). Although attachment to peers and adults is important, Hirschi contends that the attachment to one's parents is the most vital. It is especially important during adolescence when teenagers are not under constant supervision by their parents. As opposed to the "direct control" exerted by parents unto their children via monitoring and parent-child interaction, adolescents can experience the effects of their parent's "indirect control." That is, assuming that one's attachment to parents is strong, "the parent is psychologically present when temptation to commit a crime appears. If, in

the situation of temptation, no thought is given to parental reaction, the child is to this extent free to commit the act" (1969: 88).

Generally speaking, the literature has supported the claim that attachment and delinquency have a negative relationship (Hindelang, 1973; Rankin & Wells, 1990; Wells & Rankin, 1988). Nonetheless, the research community seems to disagree on a cohesive way to conceptualize and measure forms of attachment. The measurement of attachment has run the gamut from living with one's family to the number of dependents in one's family (for a review see Kempf, 1993). In a study by Rankin and Kern (1994), the researchers combined several elements (i.e. intimacy of communication, supervision, and family activities) to analyze a child's attachment to his/her mother and father. They found that those children who were strongly attached to both parents were less likely to engage in delinquent behavior than those who were only strongly attached to one parent or who were living in a single-parent household, regardless of attachment to his/her custodial parent. According to interactional theorist Thornberry (1987), however, attachment to parents is not a static attribute of a person. Many other theories argue that parental attachment and bonds are most salient during early childhood and early adolescence, while other forms of social control, including peer groups, institutions of higher education, and jobs may become more dominant in young and middle adulthood (Sampson & Laub, 1993; Thornberry, 1987). The change in dominant institutions throughout the life course is especially important given the opportunity for bonds, such as the family, to weaken.

The hypotheses guiding this research come from the aforementioned theoretical frameworks and extant empirical literature. The last two hypotheses compete with one another given the theoretical framework from which each is based.

As previously noted, Gottfredson and Hirschi (1990) claim that individuals with lower self control are likely to have a "here and now" impulsive temperament. As a result, these individuals are more prone to committing deviant acts and analogous behaviors, such as drug use. Donohew and colleagues (1990) reported that up to 80% of adolescent drug users had high levels of sensation seeking. Sensation seekers may actively seek out friends or opportunities to engage in such behaviors. Given the increased freedom when enrolled in college, opportunities for use and exposure to illicit drug use increase. In addition, "normative" college behavior may fuel such sensation seekers. For example, a study by Beck and colleagues (1995) reported that the main situational motives for college drinking was socially facilitated by drinking at bars and parties, with friends or others, for peer acceptance, reprieve from emotional pain, celebratory occasions, and as an avenue for sex seeking. In addition, individuals are given the opportunity to participate is social groups such as fraternities and sororities. These social groups have been associated with higher levels of substance use (Bell et al., 1997; McCabe, Schulenberg, Johnston, O'Malley, Bachman, & Kloska, 2005).

Hypothesis 1: Consistent with Gottfredson and Hirschi's research findings, I expect that individuals with higher levels of sensation seeking will be more likely to initiate marijuana use in college.

The importance of parental monitoring in both preventing and delaying the onset of substance use is well documented (Barnes et al., 2006; Chilcoat & Anthony, 1996; Chilcoat., Dishion, & Anthony, 1995; Steinberg et al., 1994). As noted earlier, by age 18 many individuals have been exposed to and given the opportunity to experiment with illicit substances (Kandel & Logan, 1984; Van Etten & Anthony, 2001). Parenting practices, however, are critical in teaching children skills to resist illicit temptations (Gottfredson & Hirschi, 1990; Snyder, Dishion, & Patterson, 1986). This impact has been reported in both childhood and adolescence. For example, in a longitudinal study conducted by Chilcoat and colleagues (1995), those children least monitored initiated drug use at earlier ages than those with more monitoring. According to Snyder and colleagues (1986), the family's inability to teach a child social skills consequently fosters the child's association with delinquent peers who serve to enhance the child's antisocial behavior. That is, the failure to monitor the child's choice of friends can result in the commission of delinquent behaviors. Likewise, those with less of a connection, or as Hirschi's puts it, "attachment", to his/her family will be more likely to associate with deviant peers and subsequently have a greater opportunity to try illicit substances, while those with stronger attachment appear to develop conventional behaviors.

> Hypothesis 2: Based on this literature, I expect that individuals with higher levels of reported high school parental monitoring will be less likely to initiate marijuana use in college.

Central to Gottfredson and Hirschi's General Theory of Crime (1990) is the argument that parenting practices essentially 'create' self-control in the child. That is, the

personality traits associated with low self control are generated in the absence of parents monitoring their child's behavior, recognizing deviant behavior, and punishing deviant behavior. If parents adequately fulfill these three requirements, then their child should establish higher levels of self control. Likewise, those parents who fail to appropriately monitor their child's behavior and fail to recognize and punish the delinquent behavior will have children with low levels of self control.

Hypothesis 3: If these assumptions are accurate, I expect parental monitoring and sensation seeking to be negatively related.

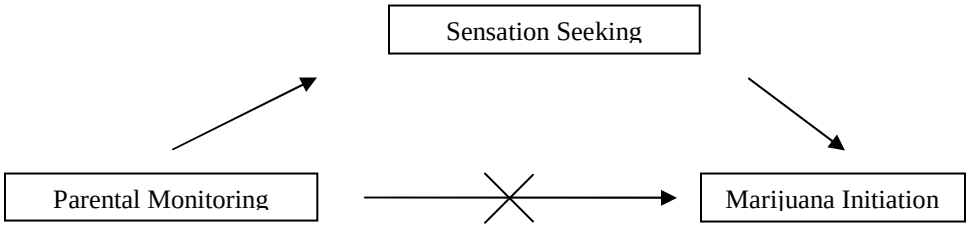
Although both aspects of self control and social control have been noted as important predictors of delinquent behavior, only a few studies have examined them both in the same model (Chapple et al. 2005; Wright, Caspi, Moffitt, & Silva, 1999). Chapple and colleagues (2005) examined the effects of parental factors, such as attachment and monitoring, on adolescent drug use and found that they indirectly impact an adolescent's drug use via self-control. On the other hand, Wright et al. (1999) found that social bonds largely mediated the relationship between self control and crime. However, the variables in Wright et al.'s analysis included peer, job, and partner influences in addition to family influences. Because of the inclusion of these other forms of social control, we cannot completely compare these two findings.

Although Gottfredson and Hirschi take parenting practices into consideration, they argue that parental influence is "exerted through the narrow conduit of self-control" (Unnever, Pratt, & Cullen, 2003: 472). That is, regardless of any other relationship two variables may have, when self-control (or in this case, sensation seeking) is put into the

model, it eliminates any other relationship. Nonetheless, research suggests a more complex relationship (Wright et al., 1999).

Hypothesis 4: Assuming Gottfredson and Hirschi are correct, I expect that sensation seeking will mediate the relationship between parental monitoring and marijuana initiation in college. This expectation is depicted in Figure 1.

Figure 1. The Mediation Model.

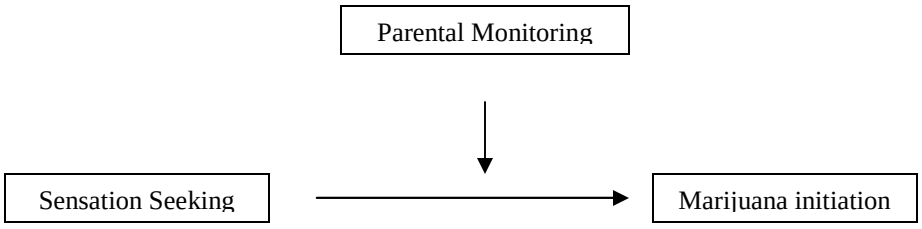


By age 18, a large majority of individuals will have already been exposed to and had initial opportunities to try most substances (Kandel & Logan, 1984; Van Etten & Anthony, 2001). As prior literature has shown, parental monitoring is extremely significant in delaying and/or deterring substance use (Barnes et al., 2006; Chilcoat & Anthony, 1996). Although no research to date has examined the effect of parental monitoring on sensation seeking after early childhood, it remains a strong possibility that there may be some pertinent influence, especially for those individuals who have no substance use prior to college. Hirschi's Social Control (1969) theory posits that parents can still induce a psychological presence in the minds of their children, even for children who may rank high in sensation seeking. If the individual's attachment to his/her parents

is strong, and conscious thought is given to his/her parent's reaction to any deviant behavior, there should be some constraint exhibited.

Hypothesis 5: Consistent with Hirschi's theory, I expect parental monitoring to moderate the relationship between sensation seeking and marijuana initiation in college. This expectation is depicted in Figure 2.

Figure 2. The Moderation Model.



DATA AND METHODS

Sample

The research study will utilize data from the *College Life Study* (CLS), an ongoing longitudinal study of college students at a large, public, mid-Atlantic university in which the unit of analysis is the student. The information on data collection comes from a larger paper explaining the methods, overall comprehensiveness, patterns, and policy implications of the CLS (Arria et al., 2008a). The target population of the study was all first year students ages 17 to 19. The sample was created in two stages. The first stage involved a computer screener survey given to 3,347 incoming first-time, first-year students ages 17 to 19 during their summer orientation in 2004. The screening survey included questions on demographic characteristics, prior drug and alcohol use, and

socialization characteristics such as parental monitoring and religiosity. Overall, 88.7% (n=3,413) completed the screener either during orientation or via a link provided to them in the mail. Further exclusions were conducted from the screening sample size due to age requirements, the reporting of a fictitious drug, administrative issues, and inadequate or missing information on drug use response questions[2]. After all exclusions, the final sampling frame was 3,291, or roughly 79.1% of the incoming freshman population.

The next sampling stage involved selecting individuals to participate in the longitudinal portion of the study (Arria et al., 2008a). The 3,291 incoming students were stratified into three groups based on lifetime drug use as noted in the screener: prevalent cases, high-risk cases, and low-risk cases. Prevalent cases were defined as students who reported using substances other than marijuana (n=469; 14.3% of the screened sample). High-risk cases were defined as students who reported using marijuana at least once but had not engaged in any other drug use (n=847; 25.7% of the screened sample). Low-risk cases were defined as students who had never used any drug, including marijuana (n=1,975; 60% of the screened sample). Prevalent cases and high-risk cases were over-sampled in the selection of students for the longitudinal portion of the study. That is, all students who had engaged in drug use, even once, were eligible to participate in the longitudinal section, while a stratified random sample of low-risk cases was used (n=790; 40%). The final sample for longitudinal follow-up was 2,106 incoming students.

The remaining students selected were then contacted sometime during their first year of college to complete a face-to-face baseline interview. Of the 2,106 students, the

[2] Twelve participants were excluded because they either did not meet the age requirements of between 17 and 19 or because they reported the use of a fictitious drug in the screening survey. Another 110 participants were excluded because they did not consent to a follow up questions or were missing (or had inadequate) information about drug use.

interview team actively recruited 1,449 students. However, of the 1,449 recruited students, the original researchers were able to gain full cooperation from 1,253 students (86%). Each of these students were then approached for follow-up assessments - individualized timelines of anniversaries and half-anniversaries based upon the date of the baseline interview. Semi-annual assessments were in an online format, while annual interviews were conducted face-to-face. Individuals were contacted to complete their assessments, regardless of their participation in prior assessments. Interviews and online assessments were conducted for four years.

For purposes of this research, I will examine data from the screener (response rate 88.7%) and all four years of college (response rates 86.5%, 91.1%, 87.9%, and 87.6% respectively). To achieve this high response rate and reduce any form of subject fatigue, the research team employed many strategies such as multiple call backs, emails, and messages through online social network sites. In addition, the monetary benefits of participating in the study helped decrease non-responsiveness. Due to the high response rate, it can be more comfortably accepted that there was no bias or major difference between those who completed the interview and those who did not participate. One can also infer a high level of reliability of the results.

Measures

The survey measures utilized in this research were obtained during the screener survey and all subsequent annual interviews. A summary of the scaled measures will be provided in the Appendices.

Demographics

Prior literature has shown that demographics may have an impact on levels of parental monitoring, sensation seeking, and drug use. To assess race, respondents were asked "How would you describe yourself?" in which the respondent had the option to choose multiple racial/ethnic categories. Very few students described having multi-racial backgrounds and the majority of individuals identified themselves as white[3]. An ANOVA was conducted to compare the variation of the racial category scores on key independent variable, parental monitoring and sensation seeking. Since there were no significant differences between the racial categories, race was coded as a dichotomous variable (White=1 or Non-white=0). Sex was coded as male (1) or female (0) as observed by the interviewer. Adjusted Gross Income (AGI) of each student's home zip codes was used as a proxy for socioeconomic status[4]. Income is presented in $10,000. The religiosity question in the screener was modeled after the MTF survey which asks "How important is religion in your life?" Respondents answered either "not important," "slightly important," "moderately important," or "extremely important." These responses were later dichotomized as low levels of religiosity (if "not important" or "slightly important," religiosity was coded "0") and high levels of religiosity (if "moderately important" or "extremely important", religiosity was coded "1"). At the baseline interview, students were asked about their relationship with the individual(s) he/she lived with during high school. The open-ended questions give insight into the family dynamics and living situation of the respondents during high school. Responses were coded as

[3] Of the individuals who did not use marijuana prior to college, 64.3% identified themselves as white; 11.8% black; 13.4% Asian; and 10.5% other.

[4] Adjusted Gross Income of students' home zip codes in 2003 (the last year in which students were living with their parents prior to college) was obtained from http://www.melissadata.com/lookups/taxzip.asp.

"lived with both mother and father," "lived with single parent," "lived with blended family (one or more stepparents) and "other living situation." Whether or not the student was enrolled in school at the time of the interview was also examined. Since individuals who drop out of school may be more likely to initiate illicit substance use, it is important to differentiate those individuals from those who were enrolled or transferred to another school. Based on information obtained from the University on GPA as well as questions asked during the in-person interviews, enrollment status was coded as stopped out/dropped out, continuously enrolled, or transferred/abroad.

Parental Monitoring

Parental monitoring in high school was measured during the screener survey. The CLS's measure for parental monitoring during the last year of high school is a slightly adapted version of a nine-item parental monitoring scale developed by Capaldi and Patterson (1989) (as cited in Arria et al., 2008c). The original scale was designed to assess a child's perception of parental rule-setting, supervision, consequences and monitoring; however, for purposes of the CLS, the word "child" was changed to more appropriately measure college aged students. The nine-item scale asked respondents to think back over their last year in high school and answer questions such as, "When you got home from school, how often was an adult there within an hour of you getting home? When you went to parties, how often was a supervising adult present at the party?" The nine-scale items are presented in Table 5 of Appendix I accompanied by the means and standard deviations for each scale item. Each item is scored on a five-point scale with a higher score signifying a higher recorded level of parental monitoring. The CLS parental

monitoring version had a good measure of internal reliability, Cronbach's $\alpha = 0.76$, thus reflecting a consistency among items in the scale.

Sensation Seeking

Sensation seeking in the baseline interview was ascertained from the Zuckerman-Kulhman Personality Questionnaire-Short Form (ZKPQ-S) (Zuckerman, 2002). The questionnaire consists of 35 items – seven items for five major factors (impulsive sensation seeking, socialiability, neuroticism-anxiety, aggression-hostility, and activity). For purposes of CLS, only the impulsive sensation seeking factor and the respective seven items were utilized, addressing the need for excitement, unpredictability and the like. For example, students were asked to answer true or false to questions such as "I am an impulsive person. I prefer friends who are excitingly unpredictable." Table 6 of Appendix I displays the items pertaining to the impulsive sensation seeking scale along with the frequencies of each answer. Internal reliability of ZKPQ-S for males and female college students was 0.62 and .71 respectively (Zuckerman, 2002). These good internal reliabilities give support of internal consistency among the impulsive-sensation seeking items. Measures of validity were tested primarily using the full-length ZKPQ; however, it is acceptable to assume that the shorter version would share similar validity. Satisfactory discriminant validity was noted between the ZKPQ impulsive sensation seeking scale and the Temperament and Character Inventory (TCI)- Novelty Seeking. The correlations between the two were 0.68. That is, both ZKPQ impulsive sensation seeking and TCI-N validate the measure of impulsivity. Further, Zuckerman noted that sensation seeking shows "good concurrent and predictive validity in the areas of psychopathy, drug use, and risk taking in general" (p. 393).

Conduct Problems

During the baseline interview, respondents were asked to complete a series of questions pertaining to deviant behaviors prior to age 18. The assessment was based upon symptoms of Conduct Disorder, as specified in the DSM-IV. The questions utilized in the baseline interview were taken from Johnson et al. (1995) and included behaviors such as taking property belonging to others, damaging property on purpose, shoplifting, and setting fires on purpose. Respondents had the option of choosing "never," "once," "twice," "three times" or "more than three times" and the age the behavior first occurred. A complete list of the scale items is listed in Table 7 of Appendix II. Behaviors were considered a conduct problem and included only if they occurred two or three times, depending on the severity of the behavior. The number of symptoms were then summed to create a conduct disorder scale. Internal reliability for the scale is relatively high (Cronbach's α =0.667).

Parenting Type

The students' perception of their parents' parenting style was measured during the 12 month interview. The Parental Authority Questionnaire (PAQ) measures permissive, authoritarian, and authoritative parenting styles as described by Baumrind (1971) (Buri, 1991). The questionnaire consists of 30-statements (10 permissive, 10 authoritarian, and 10 authoritative) in which respondents are to best respond how they perceived the parenting styles of their mother and father while they were growing up. Responses to each statement were made on a 5-point Likert scale ranging from "strongly disagree" to "strongly agree." The higher the score, the greater the perceived parenting style. A complete list of the questionnaire is located in Table 8 of Appendix II. It is important to

note that two forms of the questionnaire were given to adequately represent mother's authority and father's authority. Therefore, six separate scores are recorded for each participant: Mother's permissiveness, mother's authoritarianism, mother's authoritativeness, father's permissiveness, father's authoritarianism, and father's authoritativeness. The psychometric properties of the questionnaire are rather strong. Cronbach's α for the mother's permissiveness, authoritarianism, and authoritativeness were 0.75, 0.85, and 0.82, respectively. The Cronbach's Alpha for father's permissiveness, authoritarianism, and authoritativeness were 0.74, 0.87, and 0.85, respectively.

Prior Marijuana Use

Marijuana use prior to college was derived from the screener question on the age of onset of marijuana use. The age of first use was compared to the age at college entry. No prior marijuana use was coded as "0" and any prior marijuana use was coded as "1."

Opportunity to Use Marijuana

Opportunity to use marijuana was captured at all four interviews. At the first year interview, students were asked the age at which they were first offered any type of marijuana. For each of the subsequent interviews, however, students were asked "in the past 12 months, on how many days have you been offered any type of marijuana?" Since the frequency of marijuana opportunity was not of interest, a binary variable was created to denote opportunity (yes is coded "1" and no is coded "0"). Since the first year interview only asked about the age first offered marijuana, it was coded differently than the other interviews. That is, if the age at first opportunity is greater than or equal to the age that the individual was at their baseline interview, then they were coded as being

offered marijuana in the past 12 months. If the age at first opportunity was younger than the age at baseline interview, then they were coded as not being offered marijuana in the past 12 months. This may, however, capture high school opportunity because some students may have been interviewed during their first few months in college. As a result, the true number of days offered in the past 12 months may be captured in the second year data. From the 2nd year onward, students were asked the number of days offered marijuana in the past 12 months, and binary variables were created to depict either offered or not. A variable was created to represent whether or not they were offered marijuana ever during college.

Peer Marijuana Use

With the exception of the first year interview, students were asked questions about substance use among their peers. Students were asked how many close friends they currently have, and of those close friends, how many do they think have used marijuana in the past 12 months. A variable was computed by dividing the number of close friends who have used marijuana in the past 12 months by the total number of close friends. To compute a single variable for percentage of close friends using marijuana during college, the percentages of each respective year (years 2-4) were averaged[5].

ANALYTIC APPROACH

The analysis for this research was conducted in three stages. First, descriptive statistics were used to describe the entire sample of non-users of marijuana prior to college (n=314) and then comparisons were made between individuals who initiated

[5] The correlation of friends who use marijuana was strong and significant among years. In addition, the mean percent of friends using marijuana and standard deviations of these percentages were very similar.

marijuana use in college and those who did not. Simple t-tests were performed to check for any significant differences between the two groups**.** In addition, correlations were run between all predictor variables to gain a better understanding of the descriptive relationship between independent variables.

Second, bivariate logistic regression models were developed to examine both the hypothesized effects and the effects of independent control variables on the likelihood of initiating marijuana use in college. Preliminary exploration into the independent effects of the two focal predictor variables, parental monitoring, and sensation seeking is important to garner confidence that a multivariate model warrants. The bivariate logistic regressions for the likelihood of initiating marijuana use in college are expressed in models 1 and 2.

$$Y_i=\beta_0 + \beta_j(ss) + \varepsilon_i \qquad \text{(Model 1)}$$

In the above model, Y_i represents the binary dependent variable pertaining to the log odds that individual 'i' initiates marijuana use in college. An individual error term is designated by e_i. β_0 represents a constant and β_j refers to the effects of sensation seeking (ss). Likewise, in the model below, β_j refers to the effects of parental monitoring.

$$Y_i=\beta_0 + \beta_j(monitoring) + \varepsilon_i \qquad \text{(Model 2)}$$

Lastly, a series of multivariate logistic regression models were developed to control for background demographic variables as well as other suspected risk factors on the likelihood of marijuana initiation[6]. The first multivariate logistic regression model

[6] A multivariate logistic regression was run with all predictors on the likelihood of marijuana initiation in college. However, because of the limited sample size, it is important to keep the models as parsimonious as possible. As a result, only variables significant at the .05 level in bivariate analyses were included in future models. Although race and income were insignificant at .05, they were included to control for demographics. Further, since prior research has shown a relationship between race, crime, and substance

(Model 3) was extended to include the independent effects of both sensation seeking and parental monitoring. Model 4 added control variables (demographics- race, sex, income, religiosity and percentage friends using marijuana) to the equation to examine the influence of the focal independent variables when controlling for other variables. Lastly, the interactive influence of parental monitoring and sensation seeking is added in Model 5. An attempt was made to create a model utilizing a variable representing opportunity to use marijuana, however, this variable could not be added to any model because it predicts the failure to initiate marijuana perfectly among those who did not initiate. As a result, it is automatically dropped from any bivariate or multivariate model[7].

$$Y_i=\beta_0 + \beta_j(ss) + \beta_k(monitoring) + \varepsilon_i \quad \text{(Model 3)}$$

$$Y_i=\beta_0 + \beta_j(ss) + \beta_k(monitoring)+ \beta_l(demographics)+ \beta_m(\%\ friends) + \varepsilon_i \quad \text{(Model 4)}$$

$$Y_i=\beta_0 + \beta_j(ss) + \beta_k(monitoring)+ \beta_l(demographics)+ \beta_m(\%\ friends)+ \beta_n(ss*monitoring) + \varepsilon_i \quad \text{(Model 5)}$$

In each of the above models, Y_i represents the binary dependent variable pertaining to the log odds that individual 'i' initiates marijuana use in college. β_0 represents a constant and e_i denotes an individual error term. The effects of each predictor variable are also included.

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use, it was appropriate to include them into the model to control for any influence they may have on marijuana initiation.

[7] Since some research shows that people only use illicit substance if they are given the opportunity, it could be argued that the analyses should include only those individuals who were offered marijuana. Analyses were run on the sample conditioning for the opportunity to use marijuana. When models were re-run for this new sample (n=224), there appeared to be a dampening effect of parental monitoring. Furthermore, parental monitoring seemingly works through opportunity, with higher levels of parental monitoring decreasing the likelihood for the opportunity to use marijuana. However, once the opportunity to use marijuana is given, the effect of parental monitoring is insignificant. This relationship is the only significant change from the original models. Similar to the model used in this research, peers still seem to mediate the relationship between parental monitoring and marijuana initiation (peer marijuana use: β= .03; OR= 1.04; parental monitoring: β=-.01; OR=.99). The decision to keep those without the opportunity to use marijuana in the model is based on Gottfredson and Hirschi's argument that opportunity is ubiquitous and individuals with low self control will seek out opportunities.

RESULTS

Descriptive Analyses

Descriptive statistics of the entire sample of non-marijuana users prior to college can be found in Table 1. Of the 314 individuals who did not initiate prior to college, about 40% (n=127) initiated marijuana use in college while 60% (n=187) remained non-marijuana users. Approximately 75% (95 of 127 initiators) of the initiation took place during the first two years of college. Table 2 depicts the initiation rates at each year. Almost three-quarters of the sample, however, had the opportunity to try marijuana at least one time during the four years of college. Simple t-tests comparing initiating to non-initiators showed that initiators were more likely to be male, have lower levels of religiosity, associate with more friends using marijuana, have a higher level of sensation seeking, and have a lower level of parental monitoring than non-initiators. These results lend support for both Social Control Theory and the General Theory of Crime. Groups did not differ significantly on race, income, high school living situation, conduct problems, or parenting type. Opportunity to use in college explained 100% of the initiation among individuals who did not use prior to college. That is, of the 127 initiators, all of them were offered marijuana. Among those who did not initiate in college, almost 52% were given the chance to try the substance.

Table 1: Sample Characteristics

	Total (n=314)		Non-initiators (n=187)		Initiators (n=127)	
	N (%)	Mean (SD)	N (%)	Mean (SD)	N (%)	Mean (SD)
Initiated marijuana in college						
Yes	127 (40.4)					
No	187 (59.6)					

Sex						
Male	137 (43.6)		73 (39.0)		64 (50.4)*	
Female	177 (56.4)		114 (61.0)		63 (49.6)	
Race						
White	202 (64.3)		115 (61.5)		87 (68.5)	
Non-white	112 (35.7)		72 (38.5)		40 (31.5)	
Income ($10,000)		6.98 (3.10)		6.76 (3.02)		7.31 (3.22)
Religiosity						
Not/slightly	124 (39.5)		64 (34.2)		60 (47.2)*	
Moderately/ extremely	190 (60.5)		123 (65.8)*		67 (52.8)	
High school living situation			162 (86.6)		101 (79.5)	
Both parents	263 (83.8)		19 (10.2)		17 (13.4)	
Single parent	36 (11.5)		5 (2.7)		9 (7.1)	
Blended	14 (4.5)		1 (0.5)		0 (0.0)	
Other	1 (0.3)					
Offered marijuana in college						
Yes	224 (71.3)		97 (51.9)		127 (100.0)**	
No	90 (28.7)		90 (48.1)		0 (0.0)	
Sensation seeking score		2.71 (2.05)		2.33 (1.90)		3.27 (2.13)**
Parental monitoring score		31.59 (6.04)		32.63 (6.25)**		30.06 (5.38)
Conduct disorder score		2.19 (1.85)		2.03 (1.70)		2.44 $^{+}$ (2.03)
Average % of friends who use marijuana		28.11 (25.71)		16.97 (19.61)		44.79 (24.65)**
Mother's permissiveness		23.18 (5.59)		22.68 (5.24)		23.91^{+} (6.01)
Mother's authoritarianism		30.49 (7.33)		31.14^{+} (7.01)		29.54 (7.71)
Mother's authoritativeness		36.68 (6.00)		36.57 (5.93)		36.85 (6.12)
Father's Permissiveness		24.45 (6.19)		24.33 (6.32)		24.63 (6.02)
Father's authoritarianism		31.31 (7.81)		31.48 (7.90)		31.06 (7.72)
Father's authoritativeness		35.67 (6.34)		36.02 (6.14)		35.15 (6.61)

$^{+}$ = Difference between initiators and non-initiators is significant at p< .10

* Difference between initiators and non-initiators is significant at p < .05

** Difference between initiators and non-initiators is significant at p<.01

Table 2: Initiation at Each Year of College For Those Individuals Who Did Not Initiate in the Year Prior

Year	Number "at risk"	Number initiated	Percent initiated
1	314	57	18.18
2	257	38	14.79
3	219	19	8.68
4	200	13	6.50

* "At risk" refers to those individuals who did not initiate in any year prior.

* Percent initiated refers to the percentage who initiated out of those who had not initiate at any year prior

Table 3 provides a correlation matrix of all variables[8]. Because prior research suggests associations between certain predictor variables it was important to examine the following variables separately: Parental monitoring and parenting type, parental monitoring and number of peers who use marijuana, sensation seeking and conduct disorder, and sensation seeking and number of peers using marijuana. Analyses revealed only parental monitoring and mother's permissiveness (r= -.24) and mother's authoritarianism (r=.18) were significantly correlated (p<.05). Father's persmissiveness (r= -.10) and father's authoritarian style (r= .10) were only marginally significant (p<.10). Parental monitoring and number of friends using marijuana were significantly negatively related (r= -.27); as parental monitoring increases, the number of friends using marijuana decreases. It is important to note that the measure of parental monitoring refers back to the level of monitoring the individual experienced in their senior year of high school.

Similarly, not surprisingly, conduct disorder and sensation seeking were positively correlated (r=.15). Both sensation seeking (p<.01) and conduct disorder problems (p<.10) significantly were associated with marijuana initiation during college. Lastly, the significant correlation between sensation seeking and the percentage of friends using marijuana (r=.16; p <.01) supports the notion that an individual's temperament is related to his/her peer associations.

[8] Because initial correlations indicated a high correlation between sensation seeking and the interaction variable, a centering technique was utilized. By centering sensation seeking, parental monitoring, and the interaction, the issue of multicollinearity was reduced.

Table 3: Correlation Matrix of All Variables

	Initiate	Sex	White	Income	Religion	PM	SS	SS*PM	Conduct Disorder	Enroll	M. Permissive
Initiate	1										
Sex	.11*	1									
White	.07	.13*	1								
Income	.09	.06	.15**	1							
Religion	-.13*	-.16**	-.04	-.13*	1						
PM	-.21**	-.17**	-.02	0	.15**	1					
SS	.23**	.06	-.07	-.1†	.07	-.1†	1				
SS*PM	-.12*	-.01	-.07	.03	0	.09	-.14*	1			
CD	.11†	.23**	0	.07	-.05	-.24**	.15**	-.04	1		
Enroll	-.03	-.05	-.01	-.07	-.07	.01	-.16**	.05	-.05	1	
M. Permissive	.11†	.11*	.16**	.06	-.15**	-.24**	.02	-.01	.01	.05	1
M. Authoritarian	-.11†	-.04	-.34**	-.17**	.13*	.18**	.14*	.01	.06	-.12*	-.46**
M. Authoritative	.02	.03	.12*	.11†	0	.01	-.10†	-.13*	-.14*	.08	.18**
F. Permissive	.02	.09	.10†	.11*	-.16**	-.10†	0	-.05	.05	-.02	.49**
F. Authoritarian	-.03	-.01	-.27**	-.21**	.07	-.10†	.10†	0	.01	-.05	-.21**
F. Authoritative	-.07	.02	.12*	.10†	.08	.05	-.07	-.07	-.07	.09	.02
% friends using MJ	.54**	.15**	.22**	.05	-.21**	-.27**	.16**	-.10†	.21**	-.02	.09
Offered MJ	.52**	.13*	.22**	.10†	-.14*	-.24**	.15**	-.13*	.15**	-.03	.13*

† = significant at .10 *= significant at .05 **= significant at .01

Table 3: Correlation Matrix of All Variables Cont'd

	M. Authoritarian	M. Authoritative	F. Permissive	F. Authoritarian	F. Authoritative	% friends using MJ	Offered MJ
M. Authoritarian	1						
M. Authoritative	-.41**	1					
F. Permissive	-.07	-.11†	1				
F. Authoritarian	-.49**	-.09	-.50**	1			
F. Authoritative	-.11†	.38**	.14*	-.42**	1		
% friends using MJ	-.14*	.04	.03	-.08	.01	1	
Offered MJ	-.10†	.03	.11*	-.09	.02	.53**	1

† = significant at .10 *= significant at .05 **= significant at .01

Bivariate Analyses

Bivariate logistic regression analyses were conducted to understand the independent effects of the key predictor variables on the likelihood to initiate marijuana in college. Significant results at a bivariate level would provide the confidence necessary to include these variables in a multivariate model. The odds ratios and beta coefficients for Models 1 and 2 are shown in Table 4. As depicted in Model 1, level of sensation seeking has a positive significant relationship with the likelihood of initiating marijuana use in college. That is, with each additional score on the sensation seeking scale ($p<.01$) there is a 26% increase in the likelihood of

initiating marijuana. Similarly, as shown in Model 2, parental monitoring ($p<.01$) has a significant negative relationship with the likelihood of initiation. With each increase on the parental monitoring scale, the likelihood of initiation decreases by about 7%.

Table 4: Multivariate Beta Coefficients and Odds Ratios on the Likelihood of Initiating Marijuana in College

Variables	Model 1		Model 2		Model 3		Model 4		Model 5	
Psuedo R2	.04		.03		.07		.26		.09	
	Beta	OR	Beta	OR	Beta	OR	Beta	OR	Beta	OR
Sensation seeking	.23	1.26**			.22	1.24**	.19	1.21**	.18	1.20*
Parental monitoring			-.07	.93**	-.07	.93**	-.03	.97	-.02	.98
Sex							.15	1.16	.15	1.17
Race							-.31	.74	-.33	.72
Income							.07	1.07	.07	1.08
Religiosity							-.12	.88	-.14	.87
Peer MJ use							.05	1.05**	.05	1.05**
Sensation seeking*parental monitoring									-.01	.99

*= Significant at .05 **= Significant at .01

Multivariate Analyses

In addition to the bivariate analyses, multivariate logistic regression models were developed to further examine the relationship between marijuana initiation in college and a multitude of independent variables. As reported in Model 3, when parental monitoring ($p<.01$) and sensation seeking ($p<.01$) are included in the same model, they are both significantly related to the likelihood of marijuana initiation. However, this model provides evidence that sensation seeking does not offer any mediating effect on parental monitoring and the likelihood to initiate marijuana. If mediation was to appear, the significance of parental monitoring on initiation would be attenuated with the addition of sensation seeking[9]. In addition, because parental monitoring and sensation seeking are weakly correlated, we cannot expect any mediating effect.

Model 4 expands the model to include demographic control variables (i.e. sex, race, income and religiosity) and peer marijuana use. The addition of these control variables increases the model fit by about 9%. That is, parental monitoring, sensation seeking, the demographics, and percentage of friends using marijuana explain about 26% of the variation in marijuana initiation. Sensation seeking remains significant ($p<.01$), thus supporting the low self control theoretical framework. Parental monitoring, however, drops significance. The odds ratios remain relatively stable as they have for all models prior. Interestingly, percentage of friends using marijuana is significantly ($p<.01$) associated with marijuana initiaton.

[9] Correlations and additional linear regressions were run to examine the relationship between parental monitoring and sensation seeking. The two variables exhibited a weak, but marginally significant association ($r= -.10$; $p<.10$). In addition, multivariate linear regressions controlling for demographic factors and percentage of friends using marijuana were run to examine the effect of parental monitoring on sensation seeking. Parental monitoring was insignificant in predicting sensation seeking, thus supporting the notion that there is no mediating influence of sensation seeking on parental monitoring and marijuana initiation.

The interactive influence between parental monitoring and sensation seeking is exhibited in Model 5. As noted in Table 4, the interaction term does not increase the explained variation in the model and is non-significant. Similar to Model 4, sensation seeking ($p<.05$) and percentage of friends using marijuana ($p<.01$) remain significant predictors of the likelihood to initiate marijuana. With each increase on the sensation seeking scale, the likelihood of initiating marijuana increases by about 20%. Similarly, each additional one percentage point of friends who use marijuana increases the likelihood of initiating by about 5%. Nonetheless, as a result of the non-significance of the interaction, hypothesis 4 is not supported.

However, because prior literature suggests that males and females may be monitored and socialized differently, post-hoc analyses were conducted to examine gender differences. Analyses do reveal a gender-specific moderation effect. Model 5 was re-run after the sample was sorted by gender. Tables 9 and 10 in Appendix III provides the gender-specific models. Analyses revealed a significant interaction between parental monitoring and sensation seeking for females ($p<.05$). Males, however, experience no moderating influence.

DISCUSSION

Descriptively, the findings support prior literature. As noted earlier, t-tests reported significant differences between initiators and non-initiators on the basis of sex, religiosity, parental monitoring, sensation seeking, opportunity to use marijuana, and percentage of friends who use marijuana. Interestingly, contrary to what Gottfredson and Hirschi would have hypothesized, conduct problems did not significantly differ between

the initiators and non-initiators. Perhaps this reflects the fact that the sample is limited to only those individuals who did not initiate prior to college. Individuals with higher levels of conduct problems would be more likely to initiate marijuana and engage in deviant behavior prior to the age at which they enroll in college. As expected, initiators were more likely to have higher levels of sensation seeking and lower levels of parental monitoring than their non-initiator counterparts. This supports the idea that high sensation seekers will be more likely to engage in risky and deviant behaviors because they are fueled by the need for a novel and exciting experiences. Similarly, individuals with higher levels of parental monitoring were less likely to initiate marijuana, supporting Hirschi's "attachment" element that those individuals who were more closely monitored and more closely bonded with their parents are more likely to be concerned with how their parents may be affected by a deviant action, and refrain from partaking in any illegal behavior. Nonetheless, of those individuals who did initiate, approximately 75% initiated marijuana in the first two years of college. This finding also supports prior literature reporting that initiation is greatest in the first two years of college and then dwindles in the later years of college (Arria et al., 2008a). During the first two years of college, students are still forming their peer groups and becoming accustomed to the college environment where the opportunity for drug use is prevalent. Perhaps after the first two years of college, peer groups have been formed and the exposure to opportunity would have already occurred.

In addition to the descriptives about the initiators and non-initiators, the data revealed insight into four independent variable associations: parental monitoring-parenting type; parental monitoring-peer marijuana use; sensation seeking-conduct

disorder; and sensation seeking-peer marijuana use. Both mother and father permissiveness were negatively associated with parental monitoring, while both mother and father authoritarianism were positively associated with parental monitoring. These findings are not surprising given that parents with a more lenient attitude toward their children might be less likely to feel the need to keep constant watch over their child's behavior and whereabouts. Conversely, parents with stricter rules might be more likely to keep tabs on their activities. The significant negative relationship between parental monitoring and peer marijuana use suggests that a parent's level of monitoring can influence both their children's current and future deviant peer groups. Further, it can be argued that there is support for Hirschi's idea of parental attachment via the parents' "psychological presence" influencing their children's decision making. Not surprisingly, conduct disorder and sensation seeking were positively correlated with one another and associated with marijuana initiation in college. According to Gottfredson and Hirschi's theory, this relationship exists because individuals who have low self control are more likely to engage in deviant behaviors. Lastly, the significant correlation between sensation seeking and the percentage of friends using marijuana supports the idea that an individual's temperament influences his/her peer associations. Unfortunately, these correlations cannot answer any peer- "selection" versus "socialization" debate.

The hypotheses posited earlier were only partially supported. Hypothesis 1 suggesting that individuals with higher levels of sensation seeking would be more likely to initiate marijuana use in college was supported. This reflects an individual's desire for risk-taking experiences to maintain an exciting and unconventional lifestyle. Similarly, hypothesis 2 that individuals with higher levels of parental monitoring would be less

likely to initiate marijuana use in college was supported, garnering support for Hirschi's Social Control (Bonds) Theory. However, hypothesis 2 was only partially supported, as the independent effect of parental monitoring lost significance once peer marijuana use was added to the model. This seems to suggest that once individuals get into a college environment away from the watchful eye of their parents, peers become a more important influence. Perhaps a social learning perspective would be more fruitful in studying college student behavior. Social Learning theory argues that the probability that an individual will engage in deviant behavior increases, and the likelihood of conforming to normative behavior subsequently decreases, when he/she associates with others who are favorable to engaging in deviant behavior. Further, if in the past the individual has received and continues to receive a greater reward than punishment for the behavior, then he/she is more likely to engage in deviant behavior (Akers, 1998).

The hypothesis that parental monitoring and sensation seeking will be negatively related was not supported. The two variables had a weak ($r=-0.10$) and only marginally significant ($p<.10$) association. This finding is surprising, given Gottfredson and Hirschi's argument that low-self control is essentially formed from parenting practices, namely parental monitoring. It should, however, be met with caution. Sensation seeking only represents one facet of low-self control. It is possible that additional measures of low-self control may have a different relationship with parental monitoring. It is also possible that the limitation may stem from the measure of parental monitoring. This study assumes that parental monitoring has remained stable throughout childhood and adolescence. One cannot discount the possibility that the level of parental monitoring may change as children mature and in response to certain events. In this case, perhaps

Gottfredson and Hirschi are correct in contending that parental monitoring creates the basis for low-self control (in this case, sensation seeking) that is maintained past age 8.

As a result of the marginally significant relationship between parental monitoring and sensation seeking, hypothesis 4 is also not supported. That is, one cannot argue that the relationship between parental monitoring and marijuana initiation is explained through sensation seeking. Again, this finding does not support Gottfredson and Hirschi's argument that any influence of parental monitoring past the age of 8 or 9 will be explained via self-control. For any mediating relationship to have occurred, the relationship between parental monitoring and sensation seeking would have had to be apparent. The aforementioned reasons explaining why parental monitoring and sensation were not related and thus hypothesis 3 could not be supported, also apply in this instance.

The hypothesis that parental monitoring will have a moderating influence on sensation seeking and marijuana initiation in college is also not supported by the data. That is, parental monitoring has no effect on marijuana initiation at different levels of sensation seeking. However, because of prior literature showing a difference in parental monitoring and supervision for males and females, exploratory analyses were conducted on potential gender differences. Post-hoc analyses revealed a gender-specific moderating effect. According to the data, females do experience a moderating influence on the likelihood of marijuana initiation. Figure 3 in Appendix III show that for females high levels of parental monitoring damper the risk associated with sensation seeking.[10]. However, as levels of parental monitoring decrease, sensation seeking is extremely

[10] For purposes of visual simplicity, both parental monitoring and sensation seeking were broken down into three groups. Parental monitoring was broken into low parental monitoring (scores 11-28; n=88), medium parental monitoring (scores 29-36; n=153), and high parental monitoring (scores 37-45; n=73). Sensation seeking was broken into low sensation seeking (scores 0-1; n=104), medium sensation seeking (scores 2-4; n=138) and high sensation seeking (scores 5-7; n=72).

influential in marijuana initiation. Interestingly, males do not experience any moderating influence. Perhaps this finding occurs because males are not as highly monitored or perceive their monitoring to be lower than their female counterparts. Although this finding is extremely interesting, conducting additional analyses would be beyond the scope of this study. Future research should further examine the gender issue.

The data also yielded interesting non-hypothesized results. Perhaps most important is the relationship between parental monitoring and peer marijuana use. According to Model 4, peer marijuana use mediates the relationship between parental monitoring and marijuana initiation. Peer marijuana use remained a highly significant variable ($p<.01$) in Model 5, suggesting it is vital to examine peer relationships to better understand marijuana initiation. It seems that parental monitoring may be influential in preventing the initiation of marijuana in high school, but once individuals are not being directly monitored, they may be more heavily influenced by their peers.

It is also important to note that some results of this research study are inconsistent with prior literature. As noted earlier, prior literature has shown that males are more likely to initiate and use substances at higher rates than females. T-tests conducted in this study show that although males are more likely to be initiators, the sex difference becomes insignificant once other variables are controlled for in the model. The sex difference may operate through the measure of parental monitoring, peer associations, or sensation seeking. For instance, because males have lower levels of parental monitoring, any sex difference may be explained through parental monitoring. Prior literature may have found significant sex differences in substance use because of the failure to control for potentially explanatory variables, such as parental monitoring or sensation seeking.

Similarly, although prior research has shown some evidence of racial differences in substance use, no racial disparities were evidenced in this study. These differences may be a direct reflection on the various measures controlled for in the models or they may be specific to this sample. Future research should replicate this analysis.

Limitations and Suggestions for Future Research

Although the CLS is very thorough in its sampling design and methods, it is not without limitations. Foremost, the external validity of the CLS is questionable. Because the study utilizes a non-probability sampling scheme (purposive sampling) the findings may not be generalizable beyond the sample. Moreover, because the CLS only examines students at one university, it may not generalize to other students at different universities in which varying demographic and/or geographic regions are represented. In addition, it includes the potential for response bias via under or over-reporting. Because the questions ask the student to disclose whether or not they have experimented with an illicit substance, some individuals may feel uncomfortable or embarrassed to admit they had initiated. Although confidentiality was stressed before any interview took place, the possibility of purposeful underreporting cannot be discounted. As with any in-face survey, inter-rater reliability is an issue. However, to alleviate this issue and help ensure reliability the interviewer team underwent training, and were observed during various interviews.

Limitations also exist with the study design. By dichotomizing initiation into use or non-use, individuals who only tried marijuana once or twice were included with those who became persistent users. Although it may be argued that combining experimenters with persistent users presents accentuated results, it was deemed appropriate for this

study because the focus was solely on college-age initiation. Perhaps future studies should examine the persistence of marijuana use among those who initiate during college.

The temporal ordering of variables is also a limitation of this study. Sensation seeking is only measured at one point during the study, which prohibits researchers to examine any change in level of sensation seeking. In addition to sensation seeking, future research should include other aspects of low self-control to better assess the reliability and stability of the trait. Similarly, the measure of parental monitoring only asks about the students' senior year of high school. The assumption of this research is that parental monitoring has been relatively stable throughout childhood and adolescence; however, some scenarios may counter that idea. For instance, suppose the individual was not closely monitoring during childhood, yet engaged in deviant behavior that forced his/her parents to monitor more closely after the incident. In this type of scenario, parental monitoring would not have been stable throughout childhood and adolescence. Assuming Gottfredson and Hirschi are correct in arguing that parental socialization during childhood directly impacts level of sensation seeking and that level of sensation seeking is very stable, then we would not expect that sensation seeking would be predictive of parental monitoring during the last year of high school. Lastly, as noted in Arria et al. (2008c), the measure of parental monitoring in this study may be correlated with child-driven behaviors rather than solely parent behaviors. For example, Arria et al. (2008c) explain, "The item pertaining to leaving a note is both a reflection of the child's willingness to conform to pro-social behavior and perhaps the expectations set by parents about the need to leave a note" (p. 13). Future research should employ scales which delineate the differences between child-driven behaviors and parental supervision. In

addition, parental monitoring should be assessed over multiple time points to provide any evidence of the stability of parenting type throughout childhood, adolescence, and, in some cases, young adulthood.

Limitations also exist in regards to measures of key independent variables and the theoretical frameworks they were intended to represent. As noted earlier, sensation seeking is only one facet of low self-control. Perhaps additional attitudinal and behavioral measures of self-control should be added to the model to better represent Gottfredson and Hirschi's theory. Similarly, only one aspect of Social Bonds theory was included. Although this research focused on parental monitoring, and thus used the element of attachment, three elements of Social Bonds theory were neglected. Future research should include measures to better represent all aspects of the theory. For example, "involvement" could be measured by extracurricular activities or a measure of how individuals spend their time. "Belief" could be measured by asking an opinion question regarding the legality of marijuana. A measure of self-reported goals could potentially satisfy a measure of "commitment." The "attachment" element could also include measures of how often an individual has friendly talks with his/her family or how they perceive their parents would be affected if they engaged in deviant behavior.

Lastly, as mentioned earlier, future research should examine any gender differences that may appear between parental monitoring and level of sensation seeking. In addition, the influence these variables have upon one another cannot be ignored. Research should also provide a better understanding of the best "fit" between parenting type and child's temperament. For instance, should individuals with lower levels of sensation seeking be parented differently than those with higher levels of sensation

seeking? This research has laid the foundation for future studies to examine the relationship between parental monitoring and child temperament. Practical implications exist for parents sending their children off to college. For example, a parent can influence their child's future peer choices by keeping watch over the types of individuals they associate with socially. It is likely that even in college, individuals will seek out friends that are most similar to those they have had in the past. In addition, parents can strengthen the attachment between child and parent by becoming involved in their child's life, whether it by face-to-face interactions or consistent phone calls. The more an individual feels a closeness to another individual, the more likely he/she is to take that person into consideration when making decisions and engaging in deviant behavior. Although this research provides insight into the factors that influence initiation, its findings cannot be generalized without replication from other data sets in other regions.

CONCLUSION

Despite the limitations of this research, this study has made three main contributions to the literature. First, this study examines initiation of drug use among college students, a topic severely understudied. Since drug use is a highly significant problem among adolescents, it only seems appropriate to fully understand what factors are associated with the initiation of these substances. Although much information is available about drug use and its correlates, very few studies pertain to this very unique population. Even fewer studies employ longitudinal designs to capture substance use over time during one's college years. Overwhelming research suggests that both parental monitoring and levels of sensation seeking and low self control are associated with drug

use, however, few examine those factors relevant to a college population. Although this study only delved into the issue of initiation, further research is needed to implement substance use interventions and to establish policies and safeguards for at-risk college students.

Second, the study examined two highly significant predictors of deviant behavior and looked at their direct and interactive effects. This is extremely important given that most studies look at the independent effects of these predictors without giving thought to other potential relationships. These study designs often pit one theoretical framework against another instead of taking key variables and offering explanations for how they can be examined together. In addition, the inclusion of an interaction effect helps to provide a better understanding of the influence of certain variables when they are in the presence of other variables. Lastly, although no moderating effect was found for the sample as a whole, post-hoc analyses did reveal a gender specific effect. This finding is important as it provides evidence that the level of parental monitoring and a child's temperament may influence each other. For example, the study provided evidence that parental monitoring can provide a protective influence on high sensation seeking females. Future development in this area can potentially present ideas on the best way to monitor children with different levels of sensation seeking and impulsivity.

Although a number of research questions remain unanswered, this study provides additional understanding of the processes that influence marijuana initiation. Future research should make concerted efforts to further examine college student drug use and assess the transition between high school and college; a time when individuals are exposed to new opportunities to try a variety of illicit substances.

APPENDIX I

Table 5. Means and standard deviations for each item of the Parental Monitoring Scale administered to students in their screener survey during their summer orientation prior to college (n = 314)

Response Categories: 5 = All of time; 4 = Most times; 3 = Sometimes; 2 = Hardly ever; 1 = Never	**Mean (SD)**
Thinking back over your last year in high school…..	
1. When you got home from school, how often was an adult there within an hour of you getting home?	3.48 (1.27)
2. When you went to parties, how often was a supervising adult present at the party?	2.88 (1.20)
3. When you wanted to go to a party, how often did your parents confirm that an adult would supervise the party?	2.77 (1.43)
4. How often would your parents know if you came home an hour or more late on weekends?	3.95 (1.27)
5. When you broke a rule set by your parents, for example, coming home past curfew, did your parents take away privileges?	2.81 (1.33)
6. How often before you went out would you tell your parents when you would be back?	4.10 (.95)
7. When your parents were not home, how often would you leave a note for them about where you were going?	3.97 (1.23)
8. When you went out and your plans unexpectedly changed, how often did you call your parents to let them know?	3.56 (1.10)
9. When you went out, how often did you let your parents know where you planned to go?	4.07 (.85)
TOTAL SCORE:	31.59 (6.04)

Table 6. Frequencies of answers for each item of the Sensation Seeking Scale administered to students during their baseline interview (n = 314)

Response Categories: 1= True; 0= False	True	False
	N (%)	N (%)
1. I am an impulsive person	123 (39.17)	191 (60.88)
2. I enjoy getting into new situations where you can't predict how things will turn out	146 (46.50)	168 (53.50)
3. I prefer friends who are excitingly unpredictable.	147 (46.82)	167 (53.18)
4. I often get so carried away by new and exciting things that I don't think of possible complications.	100 (31.85)	214 (68.15)
5. I like "wild" and uninhibited parties.	71 (22.61)	243 (77.39)
6. I would like to live a life on the move, with lots of change and excitement.	132 (42.04)	182 (57.96)
7. I often do things on impulse.	131 (41.72)	183 (58.28)

APPENDIX II

Table 7: Conduct Disorder Scale administered to students during their baseline interview

Response categories: Never; Once; Twice; Three Times; More than Three Times Participants were asked the age that any behavior first occurred.
Before you turned 18, how many times did you….
1. Take property belonging to others?
2. Bully, threaten or tried to intimidate another person?
3. Damage property on purpose?
4. Shoplift?
5. Forge someone's signature?
6. Lie to get something or to avoid responsibility?
7. Hurt others physically?
8. Start fights with other people?
9. Cause physical harm to an animal?
10. Often stay out at night without parental permission before you were 13 years old?
11. Break rules?
12. Skip school before age 13?
13. Run away from home (overnight) at least twice while living at home or once without returning for a lengthy period?
14. Steal something from someone?
15. Use a weapon in a fight?
16. Force someone into sexual activity?
17. Break into someone else's house, building or car?
18. Set fires of purpose?

Table 8: Parenting Authority Questionnaire administered to students at the 12 month interview

Response categories: Strongly Disagree, Disagree, Undecided , Agree, Strongly Agree
1. While I was growing up my mother/father felt that in a well-run home the children should have their way in the family as often as the parents do.*
2. Even if her/his children didn't agree with her/him, my mother/father felt that it was for our own good id we were forced to conform to what she/he thought was right.**
3. Whenever my mother/father told me to do something as I was growing up, she/he expected me to do it immediately without asking any questions.**
4. As I was growing up, once family policy had been established, my mother/father discussed the reasoning behind the policy with the children in the family.***
5. My mother/father has always encouraged verbal give and take whenever I have felt that family rules and restrictions were unreasonable.***
6. My mother/fathers has always felt that what child need is to be free to make up their own minds and to do what they want to do, even if this does not agree with what their parents might want.*
7. As I was growing up my mother/father did not allow me to question any decision she/he had made.**
8. As I was growing up my mother/father directed the activities and decisions of the children in the family through reasoning and discipline.***
9. My mother/father has always felt that more force should be used by parents in order to get their children to behave the way they are supposed to.**
10. As I was growing up, my mother/father did not feel that I needed to obey rules and regulations of behavior simply because someone in authority had established them.*
11. As I was growing up I knew what my mother/father expected of me in my family, but I also felt free to discuss those expectations with my mother/father when I felt that they were unreasonable.***
12. My mother/father felt that wise parents should teach their children early just who is boss in

the family.**
13. As I was growing up, my mother/father seldom gave me expectations and guidelines for my behavior.*
14. Most of the time as I was growing up my mother/father did what the children in the family wanted when making family decisions.*
15. As the children in my family were growing up, my mother/father consistently gave us direction and guidance in rational and objective ways.***
16. As I was growing up my mother/father would get very upset if I tried to disagree with her/him.**
17. My mother/father feels that most problems in society would be solved if parents would not restrict their children's activities, decisions, and desires as they are growing up.*
18. As I was growing up my mother/father let me know what behavior she expected of me, and if I didn't meet those expectations, she/he punished me.**
19. As I was growing up my mother/father allowed me to decide most things for myself without a lot of directions from her/him.*
20. As I was growing up my mother/father took the children's opinions into consideration when making family decisions, but she/he would not decide for something simply because the children wanted it.***
21. My mother/father did not view herself/himself as responsible for directing and guiding my behavior as I was growing up.*
22. My mother/father had clear standards of behavior for the children in our home as I was growing up, but she/he was willing to adjust those standards to the needs of each of the individual children in the family.***
23. My mother/father gave me direction for my behavior and activities as I was growing up and she expected me to follow her/his direction, but she/he was always willing to listen to my concerns and to discuss that direction with me.***
24. As I was growing up my mother/father allowed me to form my own point of view on family matters and she/he generally allowed me to decide for myself what I was going to do.*
25. My mother/father has always felt that most problems in society would be solved if we could get parents to strictly and forcibly deal with their children when they don't do what they are supposed to as they are growing up.**
26. As I was growing up my mother/father often told me exactly what she/he wanted me to do and how she/he expected me to do it.**
27. As I was growing up my mother/father gave me clear direction for my behaviors and activities, but she/he was also understanding when I disagreed with her/him.***
28. As I was growing up my mother/father did not direct the behaviors, activities, and desires of the children in the family.*
29. As I was growing up, I knew what my mother/father expected of me in the family and she/he insisted that I conform to those expectations solely out of respect for her/his authority.**
30. As I was growing up, if my mother/father made a decision in the family that hurt me, she/he was willing to discuss that decision with me and to admit if she/he had made a mistake.***

Parenting style denoted by: *= permissive; **=authoritarian, ***authoritative

APPENDIX III

Table 9: Beta Coefficients and Odds Ratios on the Likelihood of Initiating Marijuana in College Among **Females** (n=177)

Variables	Model 1		Model 2		Model 3		Model 4		Model 5	
Psuedo R2	.04		.05		.09		.27		.30	
	Beta	OR	Beta	OR	Beta	OR	Beta	OR	Beta	OR
Sensation seeking	.26	1.30**			.25	1.29**	.26	1.29**	.23	1.26*
Parental monitoring			-.09	.91**	-.09	.92**	-.08	.92*	-.09	.91*
Race							-.65	.52	-.74	.48†
Income							.15	1.16*	.17	1.18*
Religiosity							.17	1.19	.27	1.31
Peer MJ use							.05	1.05**	.05	1.05**
Sensation seeking*parental monitoring									-.04	.96*

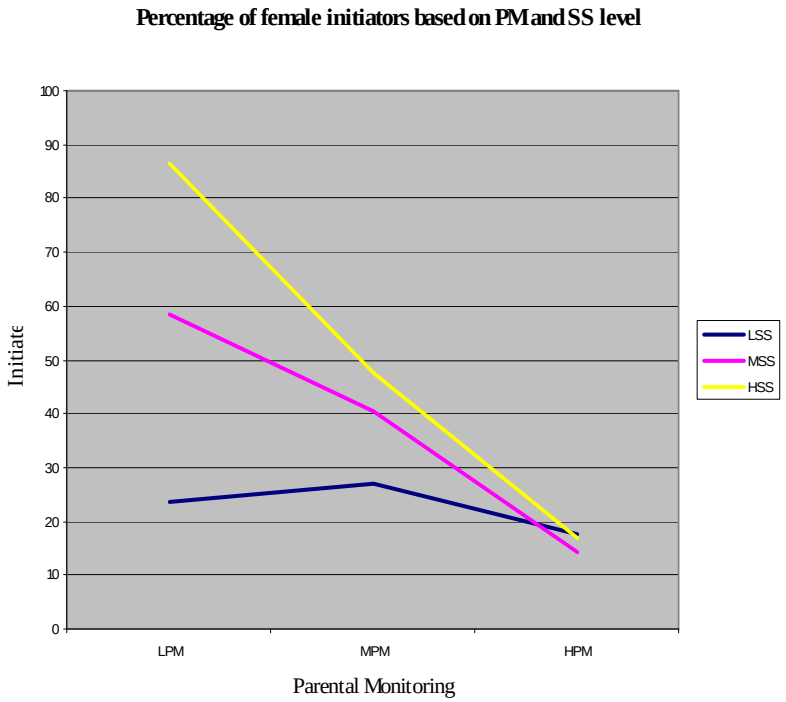
†= Significant at .10 *= Significant at .05 **= Significant at .01

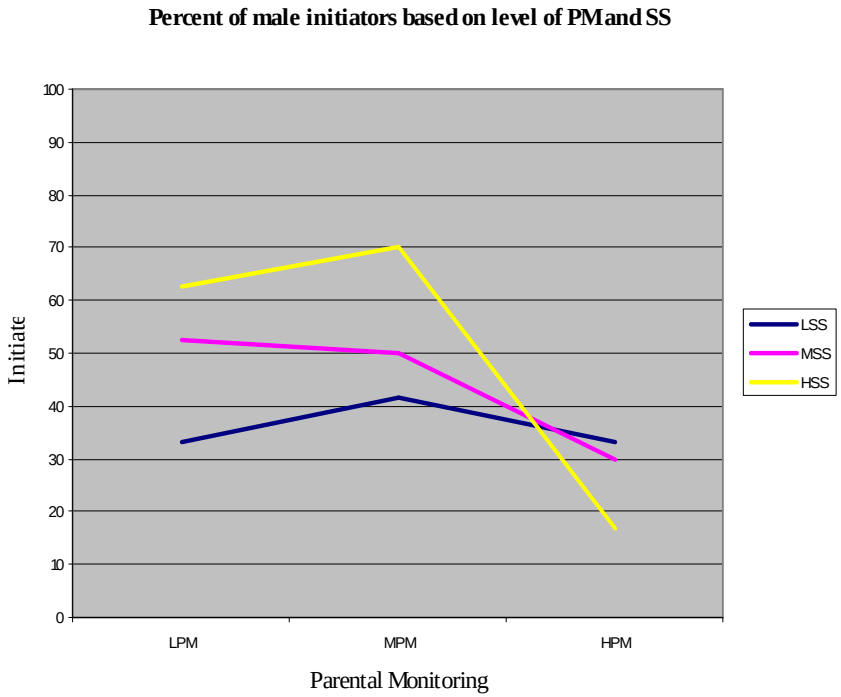
Table 10: Beta Coefficients and Odds Ratios on the Likelihood of Initiating Marijuana in College Among **Males** (n=137)

Variables	Model 1		Model 2		Model 3		Model 4		Model 5	
Psuedo R2	.03		.01		.04		.29		.29	
	Beta	OR	Beta	OR	Beta	OR	Beta	OR	Beta	OR
Sensation seeking	.19	1.21*			.19	1.20*	.16	1.17	.16	1.18
Parental monitoring			-.04	.96	-.04	.96	.05	1.05	.05	1.05
Race							.03	1.03	.03	1.03
Income							-.00	1.00	-.00	1.00
Religiosity							.39	.68	-.38	.69
Peer MJ use							.06	1.06**	.06	1.06**
Sensation seeking*parental monitoring									.00	1.00

†= Significant at .10 *= Significant at .05 **= Significant at .01

Figure 3: Percentage of female initiators (n=177)[11] and male initiators (n=137)[12] based on level of parental monitoring and sensation seeking





[11] LSS-LPM (n=17); LSS-MPM (n=26); LSS-HPM (n=17); MSS-LPM (n=12); MSS-MPM (n=37); MSS-HPM (n=28); HSS-LPM (n=15); HSS-MPM (n=19); HSS-HPM (n=6)

[12] LSS-LPM (n=9); LSS-MPM (n=29); LSS-HPM (n=6); MSS-LPM (n=19); MSS-MPM (n=32); MSS-HPM (n=10); HSS-LPM (n=16); HSS-MPM (n=10); HSS-HPM (n=6).

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